CORRESPONDENCE.

ORIGINAL TABLE.—ASSURANCES, JOINT LIVES.

To the Editor of the Assurance Magazine.

SIR,—May I beg the favour of your inserting in your eminently useful *Magazine* the accompanying Tables of Single and Annual Premiums for Joint Life Assurances for all ages between 15 and 60, deduced by me from the Carlisle Table of Mortality, and reckoning the improvement of money at three per cent.? These premiums have been carefully checked, so that their accuracy may be relied upon.

I am not aware that any similar table has ever been published; and, considering that assurances on this principle are so constantly being effected, it cannot fail to be of considerable practical value. By its use, and by means of the table already published, of the Value of Assurances on Single Lives, may be readily deduced the value of an assurance payable on the death of the survivor of two lives, adopting the simple processes of addition and subtraction. For example: Required the present value of an assurance of £100, payable on the death of the longest liver of two lives aged respectively 32 and 43 next birthday, Carlisle 3 per cent.

Value of assurance on single life, 32 = per cent.	41·357
Ditto ditto 43 = per cent.	49·352
	90·709
Deduct value of assurance on joint lives, 32·43 per cent., per table now forwarded .	56·695
Leaves value of assurance of £100, payable on the death of the survivor . . .	34·014

To determine the annual premium payable during the joint continuance, or until the decease of both, the ordinary rules of calculation must be adopted.

I am, Sir,
Your most obedient Servant,
WILLIAM BRAID.

5, *North St. David Street, Edinburgh,*
7th May, 1855.

NOTE.—As our correspondent has been at the trouble of computing these tables, and as they will certainly afford a little additional facility, we print them in extenso (*see* page 363); but, considering the ease with which the quantities given can be obtained from the annuities by means of Orchard's Tables, we fear our readers will think Mr. Braid's labour somewhat superfluous.—ED. *A. M.*

ON ASSURANCES AGAINST ISSUE.

To the Editor of the Assurance Magazine.

SIR,—Following up the suggestion in my letter to you of the 8th of February last, in reference to the publication of practical questions, I wish to draw the attention of your readers to a class of cases now of frequent

occurrence, and which we are unable to solve correctly for want of data that can be relied upon for finding the probability of issue, male and female, of married couples at given ages, together with the probability of a second marriage by the husband, and of issue therefrom.

The cases I allude to are what have been termed "issue cases." Suppose an individual to be entitled to a life interest in certain property if another, now in possession of it, should die without leaving issue: if he desire to raise money on his contingent life interest, the leaving issue by the tenant in possession must be insured against. These contingencies are sometimes very remote; still, premiums of 20*s*., 30*s*., or 40*s*. per cent. per annum have been demanded for risks of this description, because near approximation to their actual value cannot at present be obtained..

The following proposal for insurance against issue has recently been offered:—

A, aged 58, has been married for 30 years to B, aged 53, who is stated to be in good health. They have never had any children. C, aged 26, will be entitled to a life interest in certain property if A die without leaving issue male. It is proposed to take out a policy for a sum to become payable at the death of A, provided he shall leave issue male surviving him, or shall have had such issue and it shall have attained 21 during his lifetime, and provided also C shall be living at his death. What rate of premium, single or annual, should be required for this risk?

If we suppose it certain that A will marry again if B should die first, and certain also that there will be male issue of such marriage, the question will resolve itself into finding the present value of £1 to be paid upon A dying second of the three lives A, B, and C, provided B die first. This present value is

$$\underset{11}{\mathfrak{A}}\underset{1}{\mathfrak{B}}\mathfrak{C}=\underset{1}{\mathfrak{A}}\mathfrak{C}-\underset{1}{\mathfrak{A}}\mathfrak{B}\mathfrak{C}=\underset{1}{\mathfrak{A}}\mathfrak{C}-\underset{1}{\mathfrak{A}}\mathfrak{D} \text{ suppose;}$$

the joint lives of B and C being taken equal to a single life, D.

Using the Carlisle Tables, interest 3 per cent., and taking 53 & 26 =56, we have

$$\underset{11}{\mathfrak{A}}\underset{1}{\mathfrak{B}}\mathfrak{C}=\cdot 56038-\cdot 39437=\cdot 16611.$$

As the death of either A or C at once puts an end to the contract, the equivalent annual premium is

$$\frac{\cdot 16611}{1+\text{AC}}=\frac{\cdot 16611}{11\cdot 249}=\cdot 01476.$$

Consequently, the single premium per cent. would be £16. 12*s*. 3*d*., and the annual premium per cent. £1. 9*s*. 6*d*.

There can, I think, be no doubt that the assumptions here made are very much in favour of the assurers, and that it is probable the actual risk might be covered for half the amount of annual premium, particularly as the contingency is restricted to issue male.

I am, Sir, yours truly,

ROBERT TUCKER.

Lombard Street, 2nd June, 1855.